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COMPARATIVE STUDY ON THE EFFICACY OF MAITLAND TECHNIQUE (GRADE IV) AND MULLIGAN TECHNIQUE, IN THE TREATMENT OF FROZEN SHOULDER

ABSTRACT

OBJECTIVES

To compare the effectiveness of Maitland technique (Grade IV) and Mulligan technique for the treatment of frozen shoulders.

STUDY DESIGN

Experimental Study.

STUDY SETTINGS & PARTICIPANTS

This study has been conducted at Ziauddin Hospital with 50 volunteers who participated in the study that were equally divided into two groups (pre and post treatment groups). Subjects were randomly assigned to each group.

INTERVENTIONS

Intervention given to Group A was Maitland Technique (Grade IV) and Group B, Mulligan Technique.

OUTCOME MEASURES

Functional activity of shoulder is measured by using Shoulder Pain and Disability Index (SPADI) score, Pain is measured by VAS Score, and Range of motion, measured by Goniometer both before and after treatment.

RESULTS

Both the treatments showed positive results but Mulligan technique was found to be more effective. The total SPADI score was 15.48 before and 11.92 after the Mulligan technique and 15.32 before and 13.16 after the Maitland technique.

CONCLUSIONS

It is evident that Mulligan technique is more effective for the treatment of frozen shoulder compared to Maitland technique.

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Key Words

Experimental Study, Mulligan Technique, Maitland Technique, Frozen Shoulder, Shoulder Pain and Disability Index, SPADI score, VAS Score, Goniometer

INTRODUCTION

Adhesive capsulitis is one of the most common causes of all peripheral joint disorders. The shoulder is made to stretch and produce a large amount of movement, where few movements take place through the shoulder blade and chest wall; however, many movements come about through ball and socket joint¹. The frozen shoulder also known as adhesive capsulitis is a situation where shoulder joint becomes very stiff, painful and light, further the shoulder joint is also inflamed that ultimately leads to shoulder pain and restricted Range of Motion (ROM) of shoulder in capsulitis pattern². The patient initially suffers from the situation of pain or freezing, later the condition of frozen and finally defrosting condition characterized by the limited ROM^{3,4}. The capsular pattern in the shoulder is characterized mostly with the limitation of passive lateral abduction and rotation.

The presence of capsular pattern referred to diagnosis of shoulder capsulitis. Whereas, ROM differs on the condition of the patient, on which stage of capsulitis the patient is, yet he or she still has limitations of passive ROM in a capsular pattern⁵. The Adhesive capsulitis is categorized through insidious & progressive loss of active and passive mobility in glenohumeral joint likely because of capsular contraction, however the researches have been conducted in last century, etiology and pathology of frozen shoulder remain enigmatic^{6,7}.

According to Reeves, Adhesive capsulitis has three stages of disease:

Stage 1: Characterized by pain lasting 2 – 9 months.
Stage 2: Pain sub-sides, but stiffness is marked lasting 4 – 12 months.

Stage 3: Pain resolves an improvement in the range of motion.

Where II and III stages of adhesive capsulitis and ROM are considerably restricted, where restriction of movement is in the capsular pattern i.e. external rotation is most limited, followed by limitation in abduction and internal rotation respectively⁸.

However, some authors have describes the frozen shoulder in primary frozen shoulder, that leads to which corresponds to idiopathic. The secondary corresponds to traumatic capsulitis or if some other medical condition is present alongside⁹. Actually, it persists for longer period as compared to stated period, whereas, it does not completely recovers, it never gets full recovery. The purpose of the treatment is to get the relief, sustain the range of motion and ultimately to restore function. The clinical syndrome includes limited ROM, muscle weakness and pain. However, few researchers have debated that frozen shoulder is a self-restricting disease lasting as little as 6 months; further some more researchers recommended that frozen shoulder is more prolonged disorder causing long term disability. Adhesive capsulitis is more reactive in the diabetic patients as compare to general population. It ranges from 10% to 20% in the diabetic patients¹⁰, whereas, in contrast to that it is only 2% to 5% in the general public¹¹. Furthermore, it is more common in the females as well with age range of about 40 to 70 years, where the probability of recurrence is very minimal.

Various treatment exist for the treatment of adhesive capsulitis, which ranges from rest and analgesics, physical therapy, electrotherapy, arthroscopic/open surgery,

nerve simulation (TENS), Ultrasound, deep heat and ice, whereas, as such no treatment is being considered as standard treatment¹².

Maitland Grade IV Technique

The Maitland concept is a process of analyzing, investigating and also for the treatment of neuromusculoskeletal disorder through manipulative physiotherapy¹³. There are V grades of Maitland Techniques, discussed as follows¹

- I: Minor amplitude in the start of ROM
- II: Large amplitude could not touching end of ROM
- III: Large amplitude touching restricted ROM
- IV: Minor amplitude at end of restricted ROM
- IV: Minor amplitude and high speed at end of restricted ROM

Whereas, the Grade I & II are mainly applied for the treatment of the joints limited with pain. The vibrations can have inhibitory effect on perception of painful stimuli through frequently motivating mechanoreceptors which block nociceptive pathways at the brain stem levels or spinal cord. Those no stretch motions can help in moving synovial fluid in improving nutrition of cartilage. Appropriate selection of mobilization technique for treatment can only take place after a thorough assessment and examination¹⁵. As mentioned above, the capsulitis is challenging for therapeutic as well as rehabilitation purposes.

Mulligan Technique

Mulligan's Mobilization with Movement (MWM) is nowadays getting reputation in the treatment of the musculoskeletal situations. Mulligan in 1993¹⁶ explained it is a manual therapy, where the force is being applied in the form of Glide, on the motion position and it is applied in the condition when the impaired joint could freely move along pain/impediment. It has been highlighted that the treatment through the MWM yields its impact by rectifying the faulty positions of the joints, which occurred due to strains or the injuries^{17,18}. Mulligan technique is applied for reducing the pain and improves functionality in the patient of adhesive capsulitis and reduces stiffness of shoulder.

Mulligan's technique is being applied in flexion, elevation and internal rotation, where 3 sets of ten repetitions can be applied having rest intervals of 30's during each set. Patients were treated for 5 days per week for 3 weeks¹⁹.

Kochar and Dogra (2002) concluded through quasi-randomized-clinical Mobilization in addition to Mulligan & adding with the ultrasound (US), by randomizing the subjects into three groups, one group is unable to visit hospital for the physiotherapy. Where, the 10 treatment sessions were arranged for the treatment, where the treatment was given through MWM and US, it was delivered within 1st three weeks & continued with a progressive exercise regime till next 9 weeks. The measurement was evaluated through Pain Visual Analogue Scale (VAS) of 10 cm, a weight lifting test, grip strength and self-assessment of patients. It concluded that the combination of MWM and US yields better results as compared to US only. The group who got the treatment through the combination of MWM and US showed 07% improvements as evaluated through PVAS scale²⁰

Poonam and Neeti (2010) conducted the study that Maitland technique yields immediate pain relief along with increase in ROM. The study was conducted on the

is Maitland glide & hot pack while other is Active Exercise & hot pack. They concluded that there is significant improvement in the patients got treatment of Maitland with hot pack as compared to active exercise with hot pack²¹. Teys et al. stated that clinically meaningful improvements in both ROM and pressure pain threshold occur immediately after the application of Mulligan's technique in the pain-limited shoulder²².

METHODS

Convenience sampling design is used on the OPD patients at Ziauddin Hospital. The study has been conducted on the 25 random patients suffering from Adhesive capsulitis that include both male and female patients. The consent was taken from each subject before participating into the study, thereafter, the subjects were randomly divided into groups after evaluating the inclusion and exclusion criteria. Where, randomization was executed with the help of random numbers in each group.

Group A

25 patients were selected with age range of 35 to 60 years. Group A was treated with the Maitland technique IV.

Group B

25 patients were selected with age range of 35 to 60 years. Group B was treated with the Mulligan technique.

Variable of the Study

- i. Shoulder pain and disability index (SPADI)
- ii. Ranges of Motion (external rotation and abduction)

Inclusion Criteria

Patients fulfilling following criteria were included in the study:

- i. Patient within age bracket of 35 years to 60 years
- ii. Pain in shoulder movement for the period of at least 2 months
- iii. Diagnosed frozen shoulder or adhesive capsulitis

Exclusion Criteria

- i. The patients with radiological investigation were not included in the study
- ii. Patients with Inflammatory arthritis were not included in the study.
- iii. Post fracture complication, neurological involvement, diabetic patient or any cardiac disorder.

Study Setting

The study is being conducted on fifty patients including male and female, with age range of 35 years to 60 years. The patients were diagnosed Adhesive Capsulitis by the orthopedic doctor and recommended to the Physiotherapy department of North Nazimabad and Clifton Campus of Ziauddin Hospital, Karachi.

Study Duration

The study has been conducted on the outdoor (OPD) patients of Ziauddin Hospital; the study was conducted for the period of one month.

Statistics

SPSS version 20 software was used for analysis of the gathered data. Sample-test was done to analyze within-group variables for pain and disability on SPADI. External rotation

resultant values were <0.05.

Reliability Procedure

Cronbach's Alpha coefficient of the measurements were found as 0.96. Abduction (pre and post), 0.99 for the Rotation (pre and post treatment), 0.99 for the variable Disability I and 0.904.

RESULTS AND ANALYSIS

Sample of 50 patients were included mean age of 50.34 ± 5.62. It was seen randomly selected patients 27 (54%) were females. Patients were treated by Maitland Technique while treated by Mulligan Technique. Pre and post of shoulder as well as pain are noted of the respective treatment given from the descriptive statistics that Maitland pre abduction and post abduction 105.60 respectively, which shows an increase of 8.8 in Abduction. At the same time pre abduction 103.80 before and 115.80 after treatment, ranges of abduction has shown 12 which was 103.80 before and 115.80 after treatment. External rotation was seen that external rotation before treatment 65.56 and afterwards 68.0 in Group B difference of 2.44 while in Group A difference of 2.44 treatment was 64.24 and significant difference of 5.04 in the range

Fig 1 comparison between ROM of external rotation in both groups

Pain and disability were also calculated with comparison of total SPADI scores. Group A, calculated pain was 7.60 before treatment and 6.36 and 6.80 after treatment. While Group B Pre treatment pain was 7.64 but after treatment there is reduction in both pain and disability i.e. 5.96 each score is 15.32 before and 13.16 after treatment. Group A. In Group B, the total SPADI score was 11.92 after the treatment.

Fig 2 Comparison of SPADI score for both group

It was also transpired that both these techniques are effective in the management of frozen shoulder with p-value 0.00 by applying paired sample test (Table 1).

At the same time in comparison, it is evident that there is a prominent difference in the results of both techniques. It was observed that pain and disability reduction after Maitland was only of mean difference 2.16 on SPADI scoring while a difference of 3.36 in patients who underwent Mulligan Technique (Table 2).

DISCUSSION

The present study was designed to know the efficacy of Maitland mobilization techniques in the treatment of

shoulder adhesive capsulitis by comparing with mulligan technique.

While analyzing the outcome measures of this study, it was observed that both the groups have shown significant improvement over time. Statistical analysis of the data in pre- and post intervention SPADI values illustrated difference (shown by decreasing trends in Table 1 and Figure 2 for both groups). Though both groups have significantly reduced pain scores, the difference was found in favor of Group B in between-group comparison (Table 1). Both the groups shown reduction in pain scores, and this is in agreement with previous study suggesting that mobilization reduces pain²³ due to neurophysiologic effects on the stimulation of peripheral mechanoreceptors and the inhibition of nociceptors. The activation of apical spinal neurons as a result of peripheral mechanoreceptor by the joint mobilization produces presynaptic inhibition of nociceptive afferent activity⁷.

Mechanical force during mobilization may include breaking up of adhesions, realigning collagen, or increasing fiber glide when specific movements stress the specific parts of the capsule²⁴. Furthermore mobilization techniques are supposed to increase or maintain joint mobility by inducing biological changes in synovial fluid, enhanced exchange.

Maitland's rhythmic oscillations also have an effect on circulatory perfusion. The ongoing circulatory stasis may lead to ischemia and the potential for intraneural edema, inflammation, and fibrosis. Mobilization has an effect on fluid flow as blood flow in the vessels supplying the nerve fiber and synovial fluid flow surrounding the avascular articular cartilage. This, by a pressure gradient, is generated which helps in facilitating exchange of fluid, that is, increased venous drainage and dispersing the chemical irritants. This causes a reversal of the ischemia, edema, and inflammation cycle and reduces joint effusion and relieves pain by reducing the pressure over the nerve endings.

Table 1:	Group	Paired Differences		T	Sig. (2-tailed)
		Mean	SD		
Maitland	prepain – postpain	1.24	.96	6.39	.00
	predis – postdis	.92	.27	16.61	.00
Mulligan	prepain – postpain	1.88	1.23	7.60	.00
	predisability – postdisability	1.68	1.10	7.58	.00

Table 2: Comparison of Total SPADI Score of Both Groups

	Maitland Technique (Mean)			Mulligan Technique (Mean)		
	Pre	Post	Difference	Pre	Post	Difference
Pain	7.60	6.36	1.24	7.84	5.96	1.88
Disability	7.72	6.80	.92	7.64	5.96	1.68

Mulligan's technique and stretching exercise both strategies are effective in reducing pain and restoring ROM and function in patients with adhesive capsulitis in the stiffness phase. Compared with stretching exercises, Mulligan's technique led to better improvements in terms of pain, ROM, shoulder scores. Mulligan's technique was chosen for this study because it has the advantage of increasing ROM along with providing analgesia. Mulligan's technique was compared with stretching because stretching exercises are the mainstay of exercises in joint limitations; however, in contrast to Mulligan's technique they lack an analgesic effect.²⁵ Scaringe et al.²⁶ have previously used the Mulligan's technique in addition to chiropractic manipulations of the spine for a golfer with chronic shoulder, arm and neck pain. The authors followed the patient for 29 weeks; however, they used multiple techniques, which made it difficult to delineate the specific effects of a certain treatment.

CONCLUSION

The study revealed that the Mulligan technique is more effective to the patients as compared to the Maitland technique of the treatment of the frozen shoulder. The descriptive analysis shows that the post effects of the mulligan technique is more effective in comparison to the Maitland technique which means that the frozen shoulder should be treated by the Mulligan technique.

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